

INFLUENCE OF WEATHER PARAMETERS ON INCIDENCE OF COCONUT ERIOPHYID MITE, *ACERIA GUERRERONIS* (KEIFER) (ACARINA: ERIOPHYIDAE)

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ABSTRACT

The research trial on 'Influence of weather parameters on incidence of coconut eriophyid mite, Aceria guerreronis (Keifer) (Acarina : Eriophyidae)' was conducted during 2014-2016 at Asond block, Central Experimental Station, Wakawali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, such as minimum temperature, maximum temperature, morning relative humidity, evening relative humidity, sunshine hours and rainfall. The results revealed that, among the various meteorological parameters the maximum temperature and sunshine hours found to be significantly positively correlated with per cent infestation and showed significant correlation values of 0.504 and 0.404, respectively. This indicated that as temperature increased percent eriophyid mite infestation get increased. Similarly as sunshine hours increases, the percent eriophyid mite infestation also increases.

KEYWORDS: Eriophyid Mite, *Aceria Guerreronis*, Correlation & Weather Parameters Coconut

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INTRODUCTION

Coconut palm, *Cocos nucifera* L., known as Devavriksha, tree of life, 'Kalpavriksha' tree of abundance etc. and it has been an inseparable aspect of Indian culture and rituals. Coconut is grown in more than 93 countries worldwide. World production of coconut is 12.29 MT with a total production in terms of copra equivalent of 11.04 million MT. India ranks number one among the coconut growing countries with productivity of 10122 nuts per ha and area of about 2140.50 thousand ha with a production of 21665.19 million tons. Total area under coconut in Maharashtra is about 28000 ha with a production of 187.47 million tons and productivity is 6676 nuts/ha. (Anon., 2014-15). Coconut is prone to various pests like rhinoceros beetle, red palm weevil, black headed caterpillar, eriophyid mite and rats. Among all the pests eriophyid mite is becoming a serious problem now a day. First time it was observed by Keifer at Mexico from Guerrero state in 1965. In India it was first reported in Ernakulam district of Kerala in 1998 (Sathiamma *et al.*, 1998) and in Maharashtra from Vasai tahasil of Thane district in 2002. Coconut eriophyid mites are worm-like, fusiform, microscopic, whitish to pale yellowish in colour. The adult measures 200 to 250 μ in length and 36.52 μ wide (Ramarethianam and Loganathan, 2001). They cannot be seen by naked eyes. They spread through wind and mechanically transfer of the infested nuts from one place to other. The total life cycle is completed in 10 to 20 days (Mariau, 1977). Female mite lays up to 200 eggs. Mite breeds

under the perianth and suck the sap from the meristematic tissues of the nut surface. Damaged cells eventually become suberized and hence appear brown with hard compact surface, stunt the nut growth and get dry/die, sometimes split gummy exudation. Mite population is peak on 3 to 6 month old nuts. Yield loss was found to up to 30 per cent while it may increase up to 75 to 80 per cent. Initially the damage appear as a triangular yellowish brown patch at perianth surface and as infestation advances a number of similar patches can be seen on nut which ultimately leads, to warting and longitudinal fissures on the nut (Ramarethianam and Loganathan, 2001). In future it could be a very serious pest, if not managed well at present and can cause tremendous loss in nut yield. The pest breeds very fast after rainy season. Therefore, for better understanding of pest attack, its correlation with the environment will help to take decisions for effective managements of eriophyid mite.

MATERIAL AND METHODS

A plot of 0.4 ha was selected for recording the observations on seasonal incidence of coconut eriophyid mite at Asond Block, Central Experimental Station, Wakawali which comes under Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli. Out of 71 palms twenty five palms were marked from the plot and the observations on total number of nuts and infested nuts was recorded. The per cent infestation was worked out. Similarly the grade wise nut infestation was also recorded. The observations were recorded from 3rd bunch of the palm at monthly interval. The following scale index of Devi and Umaphy (2014) was used to record intensity index.

0 - No infestation

- 1 to 25 per cent nut area infested
- 26 to 50 per cent nut area infested
- 51 to 75 per cent nut area infested
- More than 75 per cent nut area infested

Data on weather parameters like temperature (maximum and minimum), relative humidity (morning and evening), rainfall and sunshine hours for 2014-15 and 2015-16 were collected from meteorological laboratory, Pangari Block, Central Experimental Station, Wakawali. Data on incidence of coconut eriophyid mite and different weather parameters was correlated and analyzed statistically.

RESULTS AND DISCUSSIONS

The data on correlation between per cent infestation of eriophyid mite and different meteorological parameters viz., minimum temperature, maximum temperature, morning relative humidity, evening relative humidity, sunshine hours and rainfall during year 2014-2016 revealed that, among the various meteorological parameters the maximum temperature and sunshine hours found to be significantly positively correlated with per cent infestation and showed significant results of 0.504 and 0.404 correlation values, respectively. This indicated that as temperature increased per cent eriophyid mite infestation get increased. Similarly, as sunshine hour's increases, the per cent eriophyid mite infestation increases. Further, minimum temperature and evening relative humidity showed positive but weak correlation with per cent infestation of eriophyid mite with 0.179 and 0.030 correlation values, respectively but the results were found to be non-significant. While, remaining parameters like morning relative humidity and rainfall showed negative but weak correlation with per cent infestation of eriophyid mite with -0.005 and -0.442 correlation values, respectively.

The data on correlation between per cent grade wise infestation of eriophyid mite and different meteorological parameters revealed that, there was no any specific trend observed between grade wise per cent eriophyid mite infestation and various weather parameters and correlation was non-significant except maximum temperature and rainfall in grade I. The correlation coefficient of maximum temperature with grade I was 0.496 which was positively significant indicated that as maximum temperature increases the eriophyid mite infestation in grade I increase. The rainfall was negatively significant (-0.365) in grade I that indicated that when rainfall increases the eriophyid mite infestation in grade I decreases.

CONCLUSIONS

The present results are corroborative with the results of Haq (1999), who reported that, there is positive correlation between mite population and dry climate and negative with rainfall. Balaji and Hemavathy (2007) studied the correlation between temperature, rainfall and mite population and revealed that the population density was positively correlated with temperature and negatively correlated with rainfall. Sujatha *et al.* (2008) also reported that, there was a highly significant positive effect of maximum, minimum and mean temperatures on mite population during 2002 and 2003 pooled together. As the temperatures increased the mite population also increased. The mite populations were significantly affected due to temperature, rain and relative humidity.

REFERENCES

1. Anonymous, 2014-15. Coconut Development Board (CDB) www.coconutboard.nic.in
2. Balaji, K. and Hemavathy, A. T. 2007. Studies on the seasonal incidence of coconut eriophyid mite *Aceria guerreronis* Keifer (Acari: Eriophyidae). *Asian J. Bio Science*, **2**(1/2): 88-91.
3. Devi, M. and Umapathy, G. 2014. Damage potential of eriophyids on different host plants. *Trends in Biosciences*, **7** (14): 1679-1681.
4. Haq, M. A. 1999. Amazing trend in distribution of the coconut mite *Aceria guerreronis* Peninsular India and adjacent island. *Entomon*, **24**: 371-379.
5. Haq, M. A. 1999. Coconut mite threat in Kerala. *J. of Acarol.*, **14**: 58-63.
6. Keifer, H. H. 1965. Eriophyid studies B-14. California. Department of Agriculture Bureau of Entomology. p.20.
7. Mariau, D. 1977. *Aceria* (Eriophyes) *guerreronis* an important ravageur des cocoteraies africaines et americaines. *Oleagineux*, **32**: 101-111.
8. Ramarethianam, S. and Loganathan, S. 2001. Biology of *Aceria guerreronis* Keifer (Acari: Eriophyoidea: Eriophyidae) a perianth mite infesting coconut growers in India. *Pestology*, **24** (6): 36-39.
9. Sathiamma, B., Nair, C. P. R and Koshy, P. K. 1998. Outbreak of nut infesting eriophyid mite *Eriophyes guerreronis* (K) in coconut plantation in India. *Ind. Coconut. J.*, **29** (8): 1-3.
10. Sujatha, A., Rao, N. B. V. C., Varma N. R. G. and Reddy, D. R. 2008. Influence of weather parameters on population build-up of coconut eriophyid mite *Annals of Plant Protec. Sci.*, **16** (1): 215-217.

Table 1: Incidence of Coconut Eriophyid Mite during Year 2014-2016

Months	% Infestation	Grade wise Per Cent Infestation					Temperature		Relative Humidity		Sunshine Hrs.	Rain-Fall (Mm)
		0	I	II	III	IV	Min. Temp	Max. Temp	Mor. R.H.	Eve. R.H.		
Feb-14	59.92	40.08	17.18	21.88	13.00	7.86	15.48	31.58	79.06	68.42	8.37	0.00
Mar-14	60.18	39.82	35.15	19.72	4.17	1.14	17.91	34.63	77.64	66.14	8.29	0.00
Apr-14	66.80	33.20	35.79	17.96	10.57	2.48	20.16	36.36	74.65	72.65	8.39	0.07
May-14	60.17	39.83	31.88	17.21	8.60	2.48	20.14	35.34	79.30	78.63	7.99	0.28
Jun-14	58.58	41.42	30.87	17.23	8.43	2.05	20.21	33.46	81.84	74.26	4.42	8.66
Jul-14	35.86	64.14	13.68	11.06	7.91	3.21	20.10	28.65	84.17	76.57	1.28	59.64
Aug-14	35.82	64.18	13.15	11.11	8.30	3.26	20.14	29.45	84.16	77.71	2.15	26.73
Sep-14	60.09	39.91	31.82	17.11	8.69	2.47	19.99	30.17	85.77	80.81	3.62	26.74
Oct-14	52.60	47.40	38.20	11.13	2.35	0.92	19.33	34.06	87.73	78.27	6.21	1.49
Nov-14	53.14	53.14	29.25	15.01	7.20	1.68	16.51	34.66	85.89	73.96	7.19	0.27
Dec-14	47.92	47.92	10.39	14.68	15.37	7.48	14.13	33.50	81.16	75.06	6.97	0.08
Jan-15	38.44	38.44	14.62	14.07	6.96	2.79	12.28	33.50	79.03	75.80	7.83	0.00
Feb-15	35.11	35.11	25.04	7.02	2.75	0.31	12.81	34.91	78.39	76.29	8.58	0.00
Mar-15	58.52	58.52	31.46	17.31	7.97	1.79	17.32	34.91	83.73	75.70	7.42	3.09
Apr-15	60.41	60.41	31.30	16.47	9.71	2.51	19.18	34.61	85.74	84.74	7.79	0.00
May-15	64.83	64.83	31.01	19.46	10.72	3.64	20.87	35.12	86.13	84.35	8.55	0.00
Jun-15	42.23	42.23	22.58	13.07	5.21	1.37	19.85	30.92	88.80	80.40	2.95	37.08
Jul-15	31.57	68.43	16.55	10.45	3.64	0.94	21.76	30.34	83.26	72.55	3.59	15.12
Aug-15	35.63	64.37	29.27	5.83	0.93	0.00	20.51	30.26	79.17	63.50	4.13	14.50
Sep-15	58.21	41.79	29.11	17.20	10.14	3.20	20.35	31.00	81.42	59.19	2.39	10.92
Oct-15	67.15	29.38	33.09	21.82	12.11	3.60	20.63	32.13	86.84	69.14	5.18	1.84
Nov-15	50.42	49.58	25.27	15.69	7.78	1.68	20.14	33.16	84.94	71.84	6.11	0.21
Dec-15	47.59	52.41	30.08	10.89	6.21	1.74	20.41	33.50	82.12	71.06	6.97	0.00
Jan-16	42.63	70.31	17.10	9.44	2.58	0.57	20.68	33.81	81.14	69.84	7.74	0.00
Feb-16	58.99	27.53	30.26	26.40	10.43	5.38	20.74	34.11	79.37	72.22	7.80	0.00

Table 2: Correlation Coefficients of Different Meteorological Parameters with Incidence of Coconut Eriophyid Mite during Year 2014-2016

Para-Meters	% Infestation	Min. Temp	Max. Temp	Mor. R.H.	Eve. R.H.	Sunshine Hrs.	Rainfall	Test
Per Cent Infestation	1							
Min. Temp	0.179	1						NS
Max. Temp	0.504	-0.264	1					Sig
Mor. R.H.	-0.005	0.297	-0.307	1				NS
Eve. R.H.	0.030	-0.065	0.187	0.467	1			NS
Sunshine Hr.	0.404	-0.433	0.877	-0.421	0.115	1		Sig
Rainfall	-0.442	0.287	-0.788	0.343	0.162	-0.832	1	NS

Table 3: Correlation between Different Meteorological Parameters With Grade Wise Percent Infestation of Coconut Eriophyid Mite during Year 2014-2016

Grade	Meteorological Parameters					
	Min. Temp	Max. Temp	Mor. R.H.	Ev. R.H.	Sunshine Hrs.	Rainfall
0 (Zero)	0.282	-0.287	0.312	0.153	-0.255	0.277
Test	NS	NS	NS	NS	NS	NS
I (1-25%)	0.329	0.496	0.0414	-0.017	0.277	-0.365
Test	NS	Sig	NS	NS	NS	Sig
II (25-50%)	0.082	-0.064	-0.016	-0.016	0.312	-0.306
Test	NS	NS	NS	NS	NS	NS
III (50-75%)	-0.104	0.080	-0.007	0.112	0.109	-0.121
Test	NS	NS	NS	NS	NS	NS
IV (75-100%)	-0.247	-0.073	-0.115	0.008	0.125	-0.080
Test	NS	NS	NS	NS	NS	NS



Figure 1: Correlation of different Meteorological Parameters with Incidence of Coconut Eriophyid Mite during Year 2014 – 16

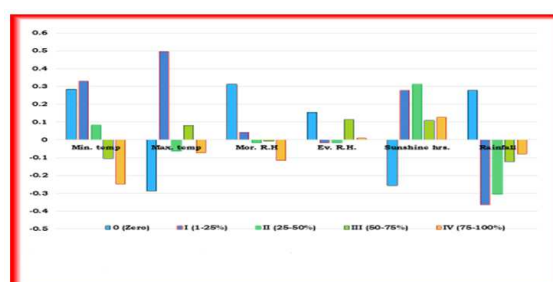


Figure 2: Correlation between different Meteorological Parameters with Grade Wise Percent of Coconut Eriophyid Mite during Year 2014 - 2016

